

Question 1.

1) Using the Airport KLX Table, describe an example that illustrates the insertion anomaly

A: When adding a new row to the table, we need to make sure that the information we are handling is consistent with existing rows. For example, if value "NULL" is added for any of the columns on the table, that will cause an insertion anomaly since none of the columns for this table should take in NULL as it's value.

2) Using the AIRPORT KLX Table, describe an example that illustrates the deletion anomaly

A: Deletion anomaly is when there is a deleted record that may contain attributes that shouldn't be deleted. For example, if Terminal A was to be deleted from the airline table, it will affect all the airlines that are assigned to Terminal A since airlines are assigned to one and only one terminal.

3) Using the AIRPORT KLX Table, describe an example that illustrates the modification anomaly

A: Modification anomaly is when incorrect data has been inserted and change must be made for the rows/tables/columns that contains the incorrect data. If new Terminal D opened but we added a terminal with terminal ID E, we would have to update all columns that lists Terminal E instead of D.

4) In the AIRPORT KLX Table, identify

A) Full (key) Functional Dependencies

A: Date, AirlineID -> NumberOfDepartingFlights

B) Partial (key) Functional Dependencies (if any)

A: AirlineID -> Terminal ID, NumberOfGates, AirlineName

C) Transitive Functional Dependencies (if any)

A: Terminal ID -> NumberOfGates

- 5) Normalize AIRPORT KLX relation up to BCNF. (Explain every step of your normalization and finally list all relations that you get because of decompositions. Do not forget to mention functional dependencies)

A:

- a) Since AIRPORT KLX table is already a relational table, it is safe to say that this table is in 1NF form at the very least.
- b) For our table to be in the 2NF, we need to get rid of all partial functional dependencies. Which in this case is AirlineID \rightarrow terminalID, numberOfGates, and AirlineName. By Creating a separate table for AirlineID and AirlineName attributes, we have eliminated all partial functional dependencies from the table.
- c) To take a step forward to be in the 3NF, we need to remove all transitive FDs from our table. Meaning we need to get rid of transitive FD of TerminalID \rightarrow NumberOfGates by creating a separate table for TerminalID and NumberOfGates.
- d) At this point, Our table is 3NF and BCNF since all tables are free from functional dependencies other than full key FD.

Date	NumberOfDepartingFlights
Primary Key	

AirlineID	Airline Name
Primary Key	

TerminalID	NumberOfGates
Primary Key	

Question 2.

- Find all keys (Candidate Keys)
A: {EmpID, ProjID, Specialization} and {EmpID, ManagerID}
- Normalize this relation up to BCNF
A: